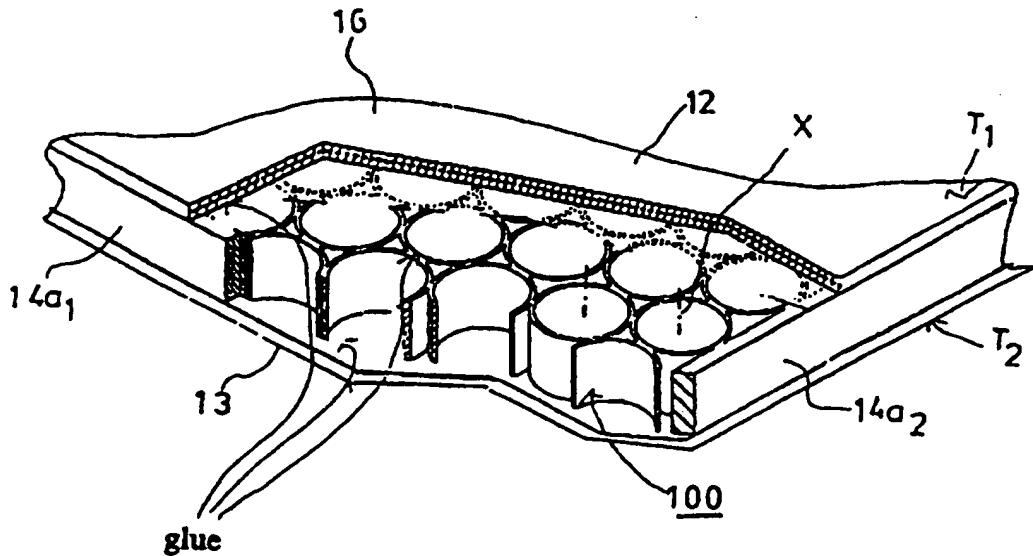




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> :  E04F 15/02, E04C 2/36		A1	(11) International Publication Number: <b>WO 97/34063</b>  (43) International Publication Date: 18 September 1997 (18.09.97)
(21) International Application Number:	PCT/FI97/00147	(81) Designated States:	AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date:	6 March 1997 (06.03.97)		
(30) Priority Data:	961120 11 March 1996 (11.03.96) FI		
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## (54) Title: FLOOR ELEMENT AND METHOD FOR MANUFACTURE OF A FLOOR ELEMENT



## (57) Abstract

The invention concerns a floor element and a method for manufacture of a floor element. The floor element comprises a bottom sheet (13) and a top board (12) and, between them, a cell structure (100) which consists of tube portions (10a<sub>1</sub>, 10a<sub>2</sub>...) that have been glued together and whose central axes (X axes) are perpendicular to the top board (12) and to the bottom sheet (13).

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## Floor element and method for manufacture of a floor element

5

The present invention concerns a floor element and a method for manufacture of a floor element.

From the prior art, the use of floor elements made of plywood and filled with 10 polyurethane is known in particular in cargo space constructions in vehicles.

In the present patent application, an improvement is suggested over the prior art. By means of the floor element described in the present application, high rigidity and good thermal insulation of the floor element are achieved with low cost of construction. 15 In the present application, a floor construction of a cell type is described, in which the main structure of the element consists of a cell system, onto which an upper plywood board and a lower metal sheet have been fixed by gluing. Onto the plywood board, a separate layer of reinforced plastic has been spread, for example fibreglass mix that contains quartz sand or a polyurethane coating which preferably 20 also contains quartz sand.

In the method in accordance with the invention, the cell structure is manufactured in a jig out of separate cardboard tubes. The length of the cardboard tubes is about 1 metre, and said tubes are fitted into the space defined by the jig plates after treatment 25 of the faces of the cardboard tubes with an adhesive. After the tubes have been glued together in the jig, the glue-joined structure is removed from the jig, and the cell system is cut by means of a band saw into sheets of a length of about 71 mm. In the cell structure, the cell tubes are fitted so that their longitudinal axes are perpendicular to the top and bottom planes of the floor element. In such a case, the 30 overall rigidity of the construction board against bending is good.

When the construction is assembled, a plywood board is placed on the bottom, the cell system is placed on the plywood board. At the sides of the floor element, there will be side walls made of plywood board. The plywood that is used is preferably birch plywood. At the assembly stage, an adhesive is applied onto the plywood board, and, similarly, at the stage of assembly of the construction, the upper metal sheet is provided with a layer of adhesive. The whole unified structural unit is placed in a press, and compression is applied while the adhesive is drying. After the adhesive agent has dried, the structure is removed from the press, and the plywood is subjected to a surface treatment so that the plywood receives a fibreglass-mix coating, which mix preferably contains quartz sand, or a polyurethane coating, which preferably also contains quartz sand.

The floor element in accordance with the invention is mainly characterized in that it comprises a bottom sheet and a top board and, between them, a cell structure which consists of tube portions that have been glued together and whose central axes (X axes) are perpendicular to the top board and to the bottom sheet.

The method in accordance with the invention for manufacture of a floor element is mainly characterized in that, in the method, the cell system is formed out of a tube structure, in which connection the tubes that have been sawed to a specified measure are fitted into a jig after adhesive treatment and in which connection, after the tubes have been joined together in the adhesive treatment inside the jig, the set of tubes is removed from the jig, and the set of tubes is sawn to cell board structures of specified dimensions, and that, in the method, the cell board thus formed is fitted between a top board and a bottom sheet, and side boards are fitted into the structure also between the top board and the bottom sheet, and the unit thus formed is subjected to compression, after which, upon drying of the adhesive, the floor element is removed from the press.

The invention will be described in the following with reference to some preferred embodiments of the invention illustrated in the figures in the accompanying draw-

ings, the invention being, however, not supposed to be confined to said embodiments alone.

5 Figures 1A...1E illustrate the manufacture of a floor element in accordance with the present invention step by step.

Figure 2 is an axonometric view of a floor element in accordance with the invention.

10 Figure 3 shows a floor element in accordance with the invention as a sectional illustration in part.

15 Fig. 1A shows the stacking of tubes 10a<sub>1</sub>,10a<sub>2</sub>... of a length of about 1 metre into the space D defined in the interior of the jig J. The jig J has been formed out of plate elements J<sub>1</sub>,J<sub>2</sub>,J<sub>3</sub>,J<sub>4</sub> and J<sub>5</sub>. The tubes 10a<sub>1</sub>,10a<sub>2</sub> are preferably made of cardboard. They can also be made of plastic.

As is shown in Fig. 1A, the cardboard tubes 10a<sub>1</sub>,10a<sub>2</sub> are stacked into the space D in the interior of the jig J. Before stacking, the faces of the tubes have been treated with an adhesive agent.

20

After drying of the adhesive, in the way illustrated in Fig. 1B, the set P of tubes is removed from the jig J interior. As is shown in Fig. 1B, sheets of a length of about 71 mm are cut off out of the glue-joined set P of tubes by means of a band saw H.

25 Fig. 1C shows a cut-off cell board structure.

As is shown in Fig. 1D, the cut-off cell board structure 100 is placed on a top board, preferably a plywood board 12. Before the cell board is fitted, the inner face of the top board 12, preferably a plywood board, is treated with an adhesive F.

30

As is shown in Fig. 1D, the bottom sheet 13, which is preferably a metal sheet, is also treated with an adhesive agent in respect of the face that is placed against the

cell board 100. At said stage, the side boards 14a<sub>1</sub>, 14a<sub>2</sub>, 14a<sub>3</sub> and 14a<sub>4</sub> are also placed in connection with the construction so that they form the side structures of the floor element. The side boards 14a<sub>1</sub>, 14a<sub>2</sub>, 14a<sub>3</sub> and 14a<sub>4</sub> are placed between the top board 12 and the bottom sheet 13. Preferably, the side walls 14a<sub>1</sub>, 14a<sub>2</sub>, 14a<sub>3</sub>, 14a<sub>4</sub> are also made of plywood, preferably birch plywood.

As is shown in Fig. 1E, the unit thus formed is placed under compression. In the figure the press is denoted with the reference numeral 15. The press 15 can be a vacuum press or any other press device whatsoever. After the structural unit has 10 become dry, the top board 12 of plywood of the floor element is coated with fibreglass or polyurethane, in which connection a layer of fibreglass or polyurethane is applied onto the top board 12. The fibreglass or polyurethane layer 16 preferably contains quartz sand.

15 Fig. 2 shows a finished floor element in accordance with the invention. Fig. 3 illustrates the floor element of Fig. 2 partly in section. The cell system 100 is fitted in such a way between the top board 12 and the bottom sheet 13 that the longitudinal axes (X axes) of the tubes 10a<sub>1</sub>, 10a<sub>2</sub>... in the cell system 100 are placed perpendicularly to the planes T<sub>1</sub>, T<sub>2</sub> of the top board 12 and the bottom sheet 13.

## Claims

1. A floor element, characterized in that it comprises a bottom sheet (13) and a top board (12) and, between them, a cell structure (100) which consists of tube portions (10a<sub>1</sub>,10a<sub>2</sub>...) that have been glued together and whose central axes (X axes) are perpendicular to the top board (12) and to the bottom sheet (13).  
5
2. A floor element as claimed in the preceding claim, characterized in that the cell structure (100) is made of cardboard and composed of cardboard tubes.  
10
3. A floor element as claimed in claim 1, characterized in that the cell structure (100) is made of plastic and composed of plastic tubes (10a<sub>1</sub>,10a<sub>2</sub>...).  
15
4. A floor element as claimed in any of the preceding claims, characterized in that the top board (12) is a plywood board, and the bottom sheet (13) is a metal sheet, and that the construction comprises side boards (14a<sub>1</sub>,14a<sub>2</sub>,14a<sub>3</sub>,14a<sub>4</sub>), the cell structure (100) remaining in the space defined by the outer board/sheet and the side boards and is joined with them by means of an adhesive agent.  
20
5. A floor element as claimed in any of the preceding claims, characterized in that the top board (12) is covered by a polyurethane or fibreglass layer.  
25
6. A floor element as claimed in the preceding claim, characterized in that the polyurethane or fibreglass layer additionally includes a resin.  
30
7. A floor element as claimed in any of the preceding claims, characterized in that the side boards (14a<sub>1</sub>,14a<sub>2</sub>...) of the floor element are made of plywood and are placed at the edges of the floor element between the top board (12) and the bottom sheet (13).  
35
8. A method for manufacture of a floor element, characterized in that, in the method, the cell system (100) is formed out of a tube structure (10a<sub>1</sub>,10a<sub>2</sub>...10a<sub>n</sub>),  
40

in which connection the tubes that have been sawed to a specified measure are fitted into a jig (J) after adhesive treatment and in which connection, in the method, after the tubes (10a<sub>1</sub>,10a<sub>2</sub>...) have been joined together in the adhesive treatment inside the jig (J), the set (P) of tubes is removed from the jig, and the set (P) of tubes is  
5 sawn to cell board structures (100) of specified dimensions, and that, in the method, the cell board (100) thus formed is fitted between a top board (12) and a bottom sheet (13), and side boards (14a<sub>1</sub>,14a<sub>2</sub>...) are fitted into the structure also between the top board (12) and the bottom sheet (13), and the unit thus formed is subjected to compression, after which, upon drying of the adhesive, the floor element is  
10 removed from the press.

9. A method as claimed in the preceding claim, characterized in that, onto the face of the top board (12), a layer (16) of polyurethane or fibreglass is spread, which layer preferably also contains a resin.

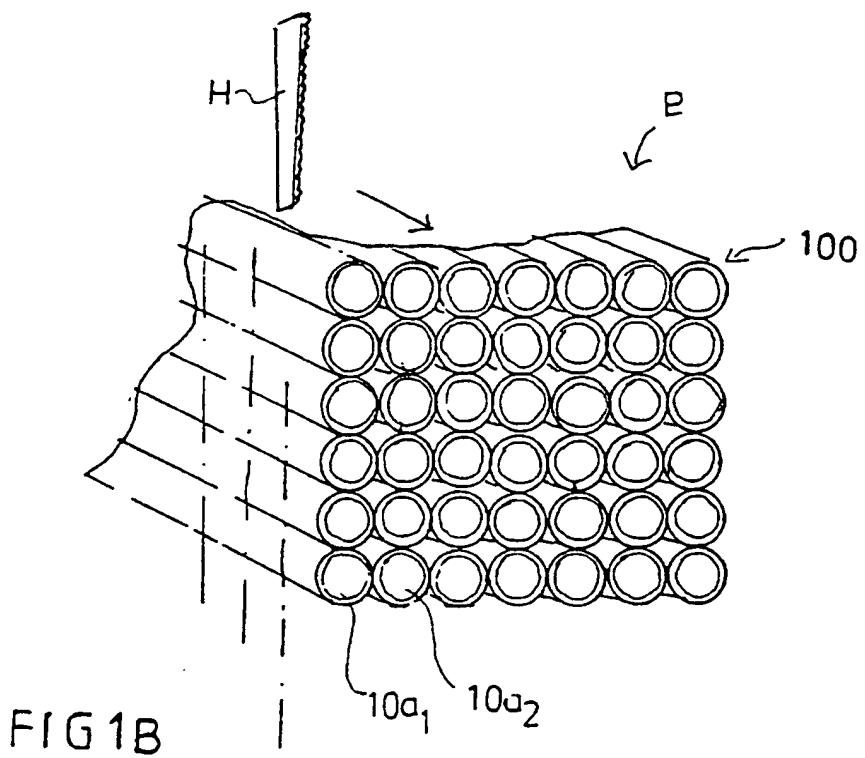
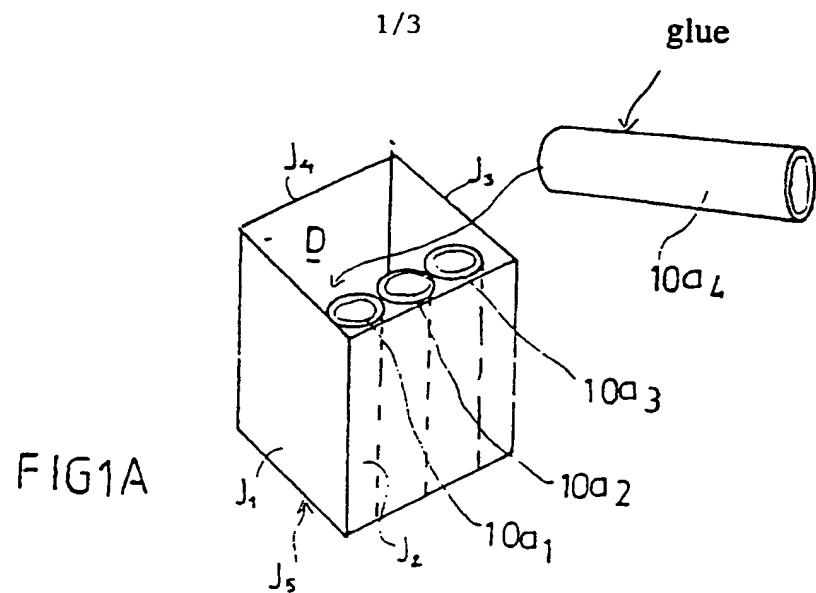


FIG 1C

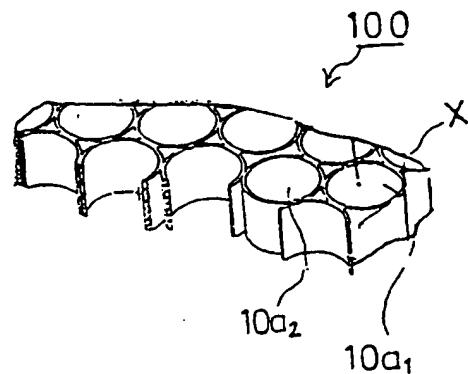


FIG 1D

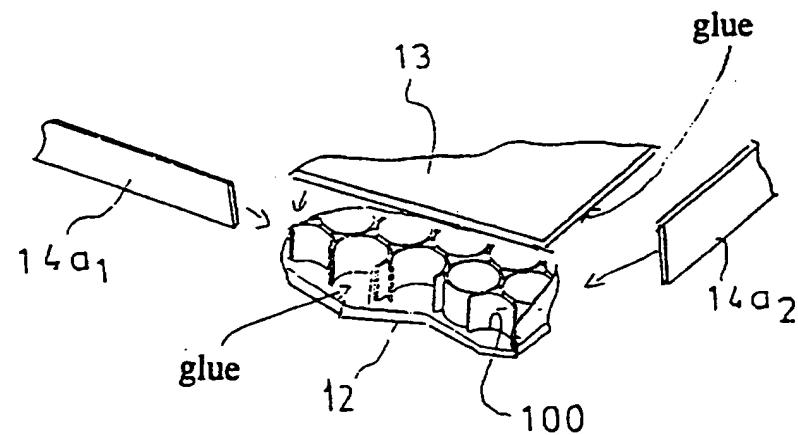
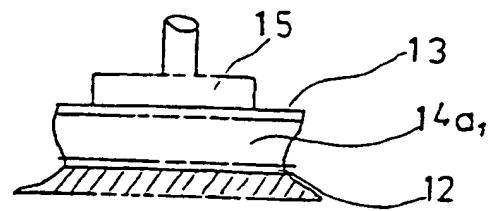


FIG 1E



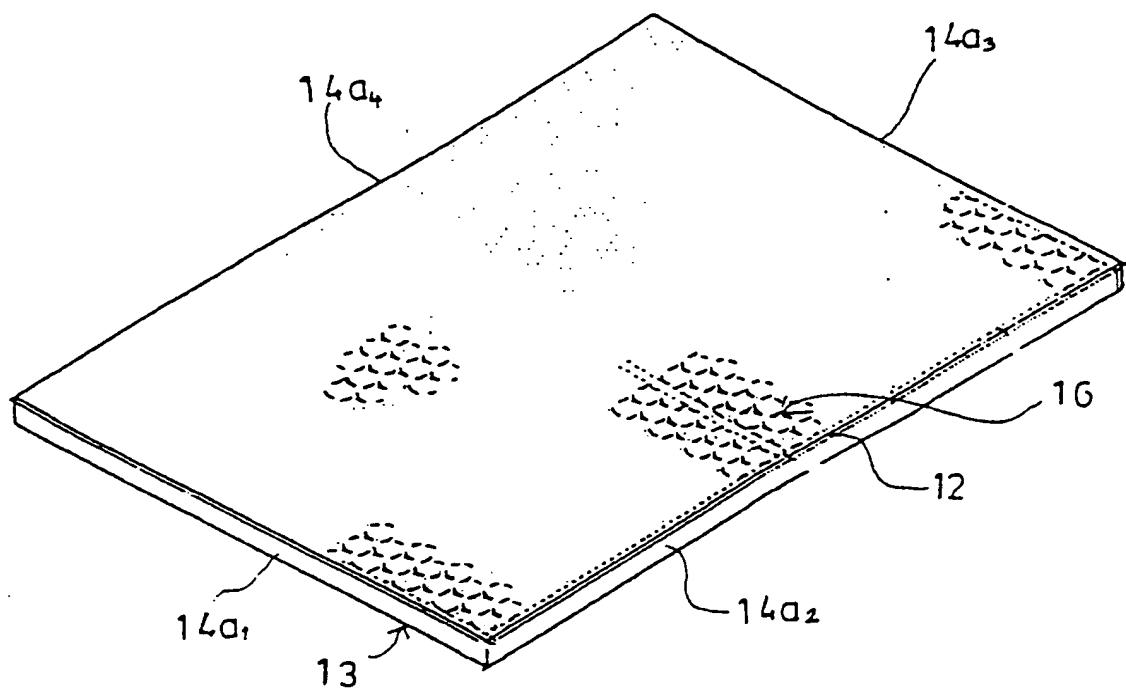


FIG 2

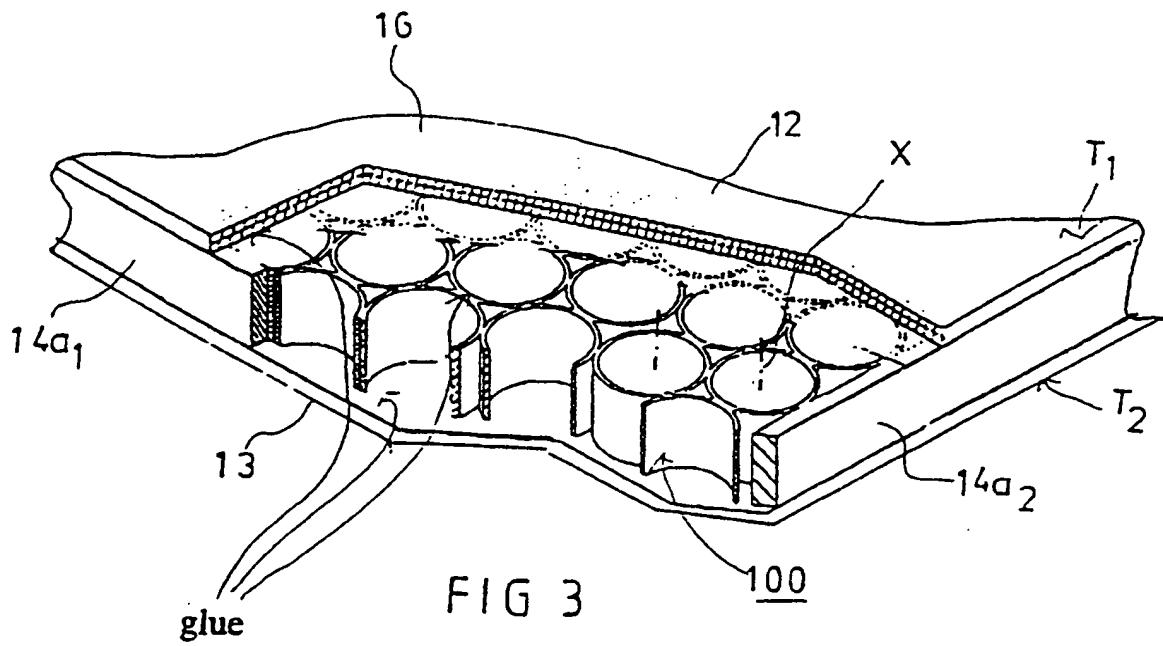


FIG 3

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00147

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E04F 15/02, E04C 2/36

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC6: E04F, E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CH 579691 A5 (FERMA INTERNATIONAL ENTWICKLUNGSWERK FÜR RATIONELLE FERTIGBAUMETHODEN UND MASCHINENANLAGEN GMBH & CO. KG), 15 Sept 1976 (15.09.76), details 11,12,15,16	1,7
Y	---	4,2,8
X	CH 440640 A (CONTRAVES AG), 29 December 1967 (29.12.67), figure 4	1
Y	---	4

 Further documents are listed in the continuation of Box C. See patent family annex.

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 2014131 A (TECHNIK SPEZIAL, KARL FRITZ REICH), 26 August 1971 (26.08.71)	1
Y	--	4,7
Y	CH 233120 A (M. HÄFLIGER), 2 October 1944 (02.10.44), page 1, line 11	2
Y	--	8
Y	FR 1108820 A (M.O. RISTIC), 18 January 1956 (18.01.56)	8
Y	--	8
Y	US 2477852 A (C.E. BACON), 2 August 1949 (02.08.49), detail 14	8

## INTERNATIONAL SEARCH REPORT

Information on patent family members

20/05/97

International application No.

PCT/FI 97/00147

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CH 579691 A5	15/09/76	BR 7405979 D DE 2336700 A JP 50071122 A SE 7409384 A	00/00/00 06/02/75 12/06/75 20/01/75
CH 440640 A	29/12/67	NONE	
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FR 1108820 A	18/01/56	NONE	
US 2477852 A	02/08/49	NONE	